

USAF

22 Mar

REMARKS:

\* Thank Curtin thru Candron and then  
round up [redacted] et al

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DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS UNITED STATES AIR FORCE  
WASHINGTON 25, D.C.



21 MAR 1963

Mr. Arthur Lundahl  
Director, NPIC  
Washington, D. C.

Dear Mr. Lundahl:

As you know, the effectiveness of our reconnaissance exploitation activities is directly dependent on our ability to handle large masses of data quickly and efficiently. In 1961, the USAF initiated a development program for photo handling equipments called "Project SCRAM" with the objective of providing advanced capabilities in this area. The specific purpose of the project was to develop prototype equipments to perform the necessary functions involved in utilizing film chips as a storage medium for selected portions of photo reconnaissance data.

The film chip concept and the associated prototype equipment are to be demonstrated at the new facility of Detachment #1, Aeronautical Chart and Information Center, 1221 South Fern Street, Alexandria, Virginia during the week of 25 March 1963.

I felt that you would be interested in reviewing these equipments and I wish to extend to you a personal invitation to visit this demonstration. Formal one hour demonstrations are scheduled at 1000 and 1500 each day of the week. For your convenience, however, we should like to arrange demonstrations to meet your schedule. Major Jarvis Caudron, Code 143, Extension 2610, will function as your escort and arrange the details of your visit.

The enclosed brochure provides an overview of the concept and some details on the equipments.

Sincerely,

*Richard D. Curtin*

1 Attachment  
Project SCRAM  
Brochure

RICHARD D. CURTIN  
Brig General, USAF  
Director of Advanced Engineering

*Thanks relayed to  
Gen Curtin via Major  
Caudron -  
Apr 63*

CONFIDENTIAL

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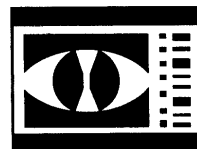
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Project SCRAM  
Brochure

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Brig General, USAF  
Director of Advanced Engineering

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# **PROJECT SCRAM**



**AIR FORCE SYSTEMS COMMAND — ROME AIR DEVELOPMENT CENTER**

## INTRODUCTION

Project SCRAM is a Rome Air Development Center program in support of the photographic data extraction process. This program deals with the problems created by high volume, high quality photo-reconnaissance systems. RADC, as project coordinator, formulated the basic design concepts, and derived specifications to insure maximum utilization of equipment already in existence. Compatibility and flexibility of operational configuration are the keynotes of the entire project.

A decision was made and coordinated with the operational commands to utilize standard size film chips, or Unit Records, as the primary storage medium; many practical advantages inherent in this concept are discussed elsewhere in this document.

A typical photographic data reduction system formed according to Project SCRAM precepts will include equipment for screening new photography and then selecting, converting, storing, retrieving and viewing imagery and auxiliary data on Unit Records. Devices for these purposes have been designed and built to improve photographic data handling methodology without introducing conflict with present Air Force operations. The complement of Unit Record handling equipment described in this brochure is for the purpose of augmenting current operational inventories to allow efficient screening, logging, and interpretation of photo intelligence data utilizing the chip concept.

As a whole, the present assemblage of equipment is designed to yield imagery of the best obtainable quality at every step, to produce accurately sized and formatted products, and to provide for rapid data processing and handling in all phases of system operation.

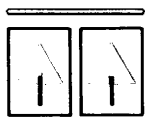
Automation was specifically avoided for two reasons:

- The equipment may be used in many operational locations with varying types and quantities of computer support.
- There will be no solid basis for deciding which functions should be automated and what extent of automation is practical until a background of operational experience with the concept has been established.

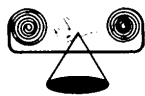
Project SCRAM represents an initial step toward standardizing and mechanizing techniques for data handling in the photo intelligence community. If the demonstrations provide useful suggestions on equipment, configurations, and techniques, and if the items of equipment developed for the program form the building blocks of an available shopping list for upgrading current operational capabilities, then the purpose of the project will be fulfilled.

RADC will continue to develop Project SCRAM concepts to achieve a very high level of utility. Techniques and procedures will be refined, reporting language and format will be standardized and, in every practical case, the processes involved in photo data handling will be automated.

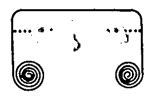
### WHY UNIT RECORDS?



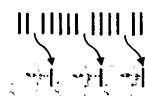
Historically the chip concept has been employed wherever a single print or stereo pair has been the working medium for interpretation.



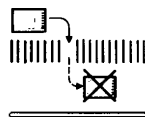
There are several disadvantages in using roll film for the non-sequential photo data extraction tasks performed after initial screening. An entire mission take may be contained on one roll of film, but if the take is stored in roll form, the whole roll must be exercised every time a particular area is wanted. This search activity creates degradation throughout the roll, even when only one area is of interest. Simultaneous use by two interpreters of the different areas on the same roll is also a problem.



With chips, only the coverage desired to do a job need be exercised at any particular time. Also, when these areas are transferred from the roll to individual chips, there is no problem in numerous interpreters working simultaneously with different areas from the original roll.



A file of Unit Records, or film chips, is easily updated. This is the most significant advantage over other media in the storage of dynamic information, i. e. aerial reconnaissance data.



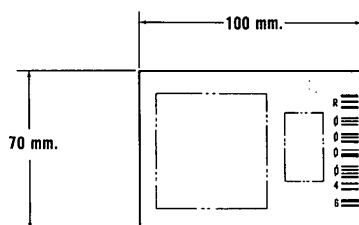
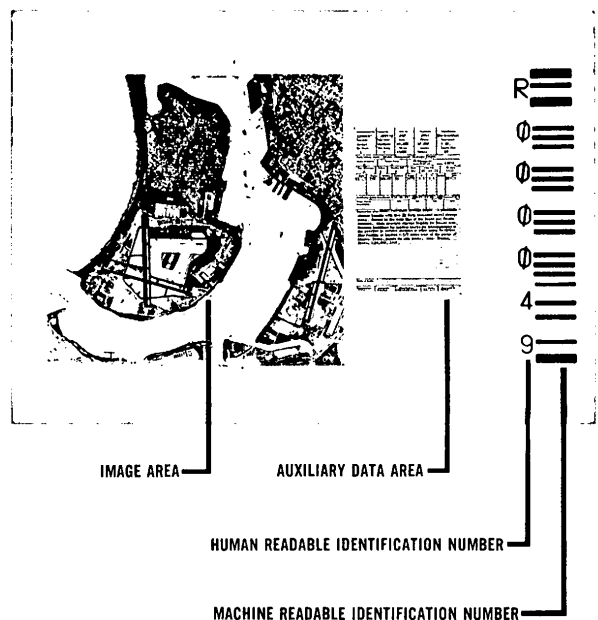
The chip concept therefore contributes both to retention of image quality and to efficiency.

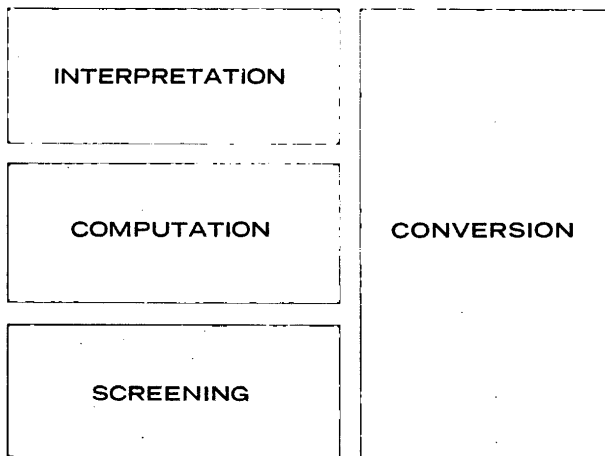
## THE UNIT RECORD

In Project SCRAM the Unit Record is a standardized Air Force film chip, illustrated at the side and in the engineering drawing below. This standard format has areas for a primary image and for a unique identifier, and is adaptable for recording many kinds of auxiliary information.

The unique identifier is invaluable as an aid to data handling for both manual and automated functions. A seven-digit, alpha-numeric identification number has been chosen as a convenient format to identify each Unit Record. This number may be revised upward as operational experience is obtained.

The image area can readily be varied in size to meet the needs of specific applications. In addition, if it is so desired, auxiliary data can be added to support or supplement the primary imagery. Space available for such data will be contingent upon the primary image size; e.g., a 63mm x 63mm image area yields an auxiliary data area 15mm x 63mm. This arrangement can accommodate 126 characters of typed auxiliary data at contact scale. With an 7x reduction, a complete UNIFILE (or SCRAM Card) report can be stored in the area available for auxiliary data.





## OPERATIONAL CONCEPTS

The equipment complement and procedures of Project SCRAM account for several basic photo-intelligence operations, which are directed by a CONTROL SOURCE and utilize a COMPUTATION function.

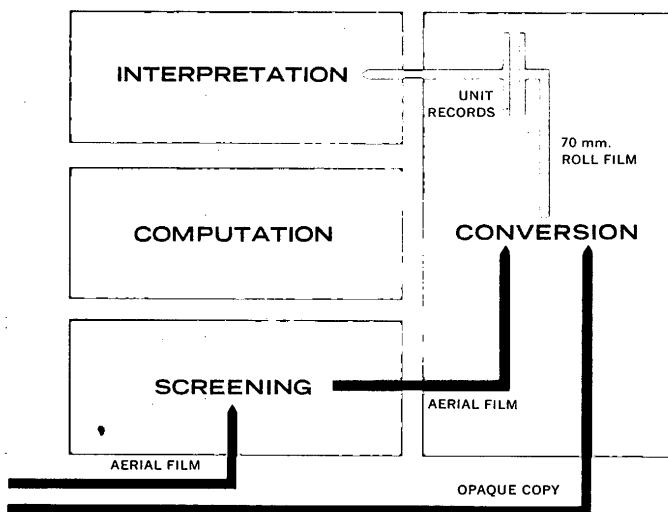
**SCREENING** In this phase, input material is reviewed and specific areas of importance are selected for attention during subsequent data extraction.

**CONVERSION** During conversion operations, the areas of interest selected through screening are recorded in the Unit Record format. Film is processed to yield complete individual Unit Records as products ready for storage or interpretation. Means are provided for converting both film and hard copy inputs to Unit Records.

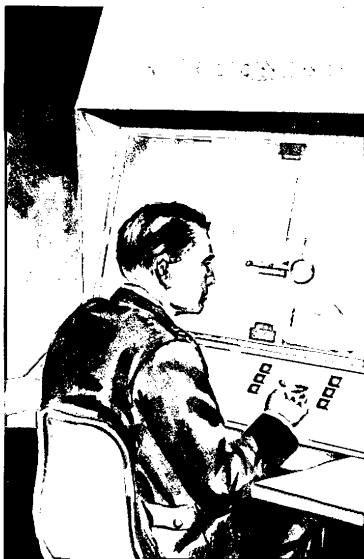
**INTERPRETATION** Here the procedural extraction of data from Unit Records takes place. Means for storing and rapidly retrieving individual Unit Records are provided to support Interpretation.

**COMPUTATION** Provisions for essential calculations and a comprehensive reference file support the various phases of Project SCRAM operations. A mensuration computer and a file search computer are integrated into the present demonstration system, but these data processing facilities can be augmented as required.

**COMMUNICATION** Essential communications linkage among the various stations is provided by SCRAM cards. The card is a modification of the UNIFILE report currently in use in the USAF intelligence community. One such card will be associated with each specific area of input photography selected for conversion, and hence with each Unit Record.



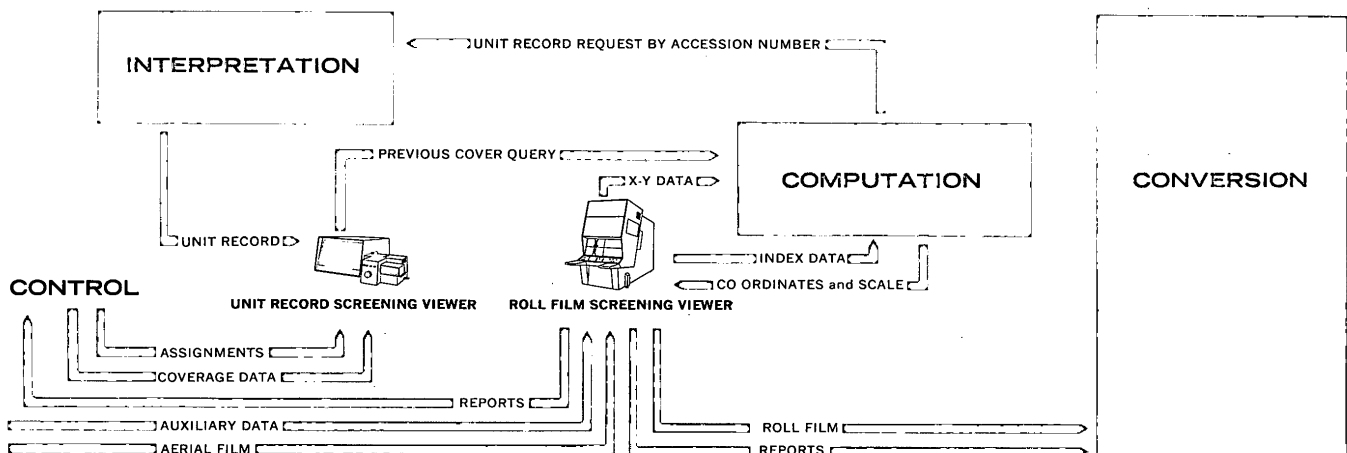


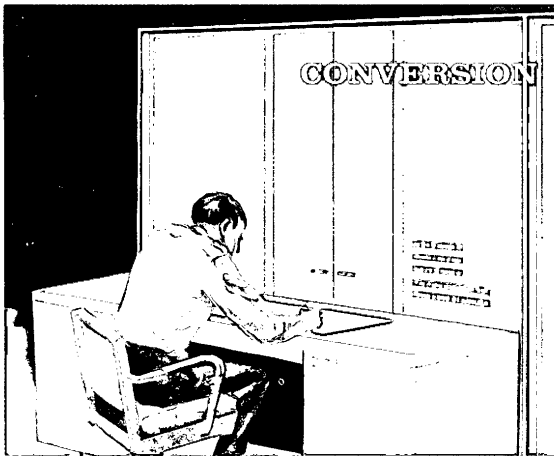


Screening and selection augment photo data reduction for a specific system application. The basic task is routine, but the intelligence yield for subsequent detailed analysis is entirely contingent upon the operation, which involves the review of all input film records. Acting under control source instructions in line with command objectives, personnel screen input photography to find and identify areas of interest for conversion to Unit Records and subsequent detailed study. To accomplish this task, pre-analysis, initial interpretation and other operations are necessary.

During **Pre-analysis**, data pertinent to expected photo coverage are accepted with specific requests for information. Reporting responsibilities are assigned, and the file is queried for photography that might help in screening the new coverage. Query may be automatically supported in many cases, or it can involve manual search through tabular listings. Pre-analysis is completed whenever possible before arrival of the mission take.

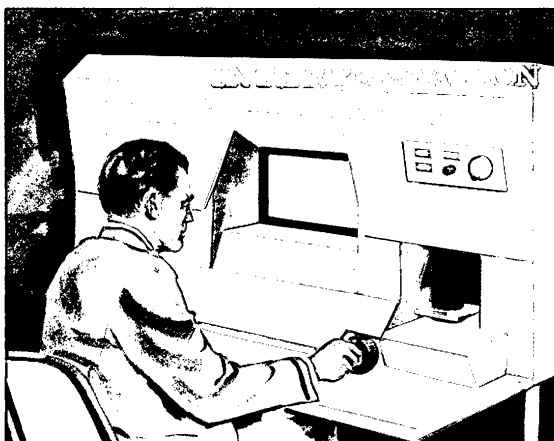
**Initial interpretation** begins with the arrival of new photography and auxiliary data. New coverage is reviewed at the Roll Film Viewer, with reference data displayed on the Unit Record Screening Viewer. Special and standing requests for data are answered at this time (if possible) and an initial report is generated. Location and scale information necessary for reports are obtained through the use of pertinent auxiliary data accompanying the new photography, and through use of the X, Y measuring capability of the Roll Film Screening Viewer and the Recomp II Computer.





In this phase, generated reports and selected areas of photography are converted into appropriate physical form for filing purposes. For the photography, this means conversion into Unit Records. For the reports, conversion may be to one or more of a number of different forms, e.g., physical report; Minicard; reduction print onto a Unit Record; reduction print onto another Unit Record containing the correlative photo area; or a magnetic tape recording.

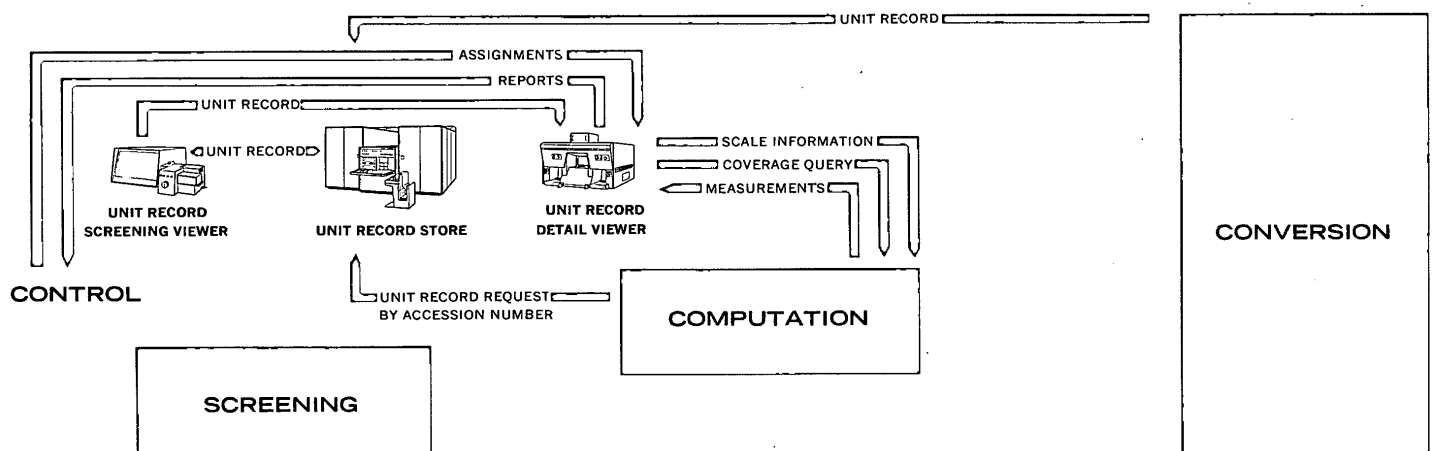
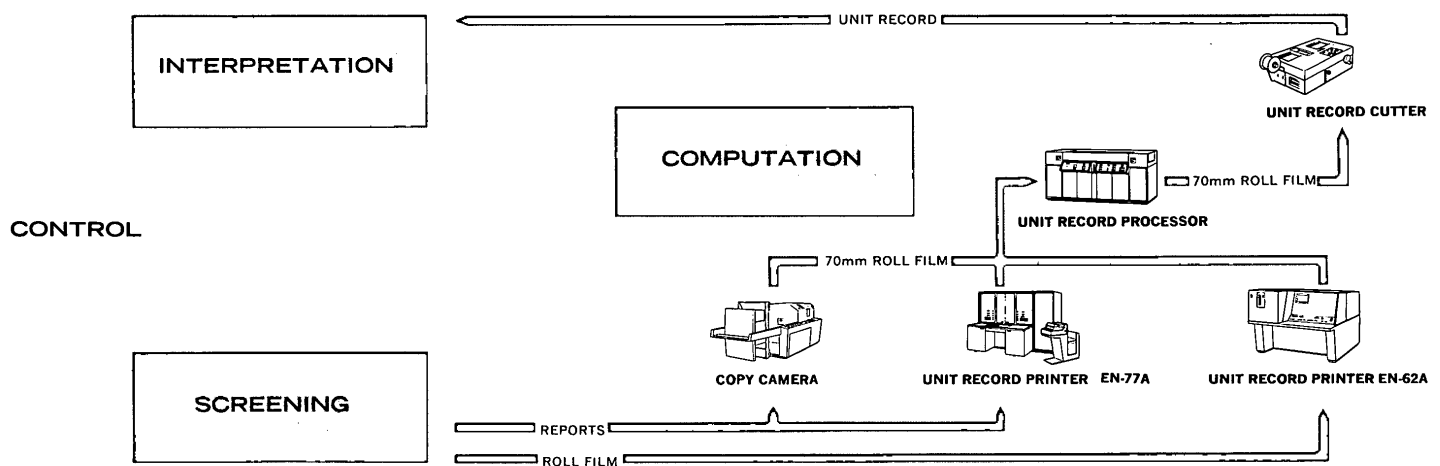
During conversion, selected data are extracted. The original input may be filed and the extracted data can be sent on for further processing. Areas of interest from the input film and hard copy are printed onto 70mm strip film by the conversion equipment, with the format as specified for the particular Unit Record. The conversion equipment also adds the Unit Record identifying number. After all relevant data are printed on the Unit Record, the film strips will be processed in a special leaderless processing machine and then cut accurately to standard Unit Record dimensions for mounting and subsequent action.

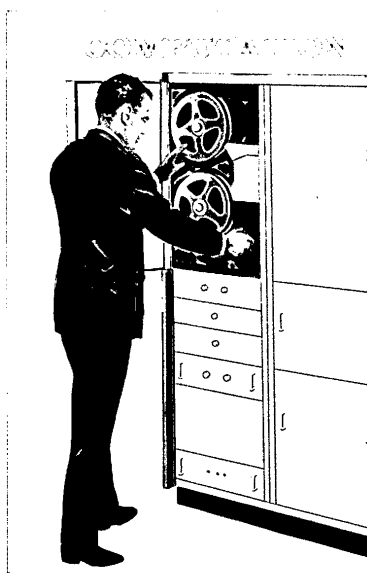


Interpretation involves the detailed study of converted photographic data recorded on Unit Records. Viewers with stereoscopic and mensuration capabilities, a storage and retrieval system, and appropriate linkage to information files and computation facilities give required support for this detailed analysis.

The control function serves to dictate priorities in the interpretation and review of intelligence reports. The storage and retrieval function provides rapid access to reference material, previous cover, keys, and filed and converted reports and hard copy. Computation facilities provide for basic and essential geometrical calculations and afford a mechanized subject index for the file.

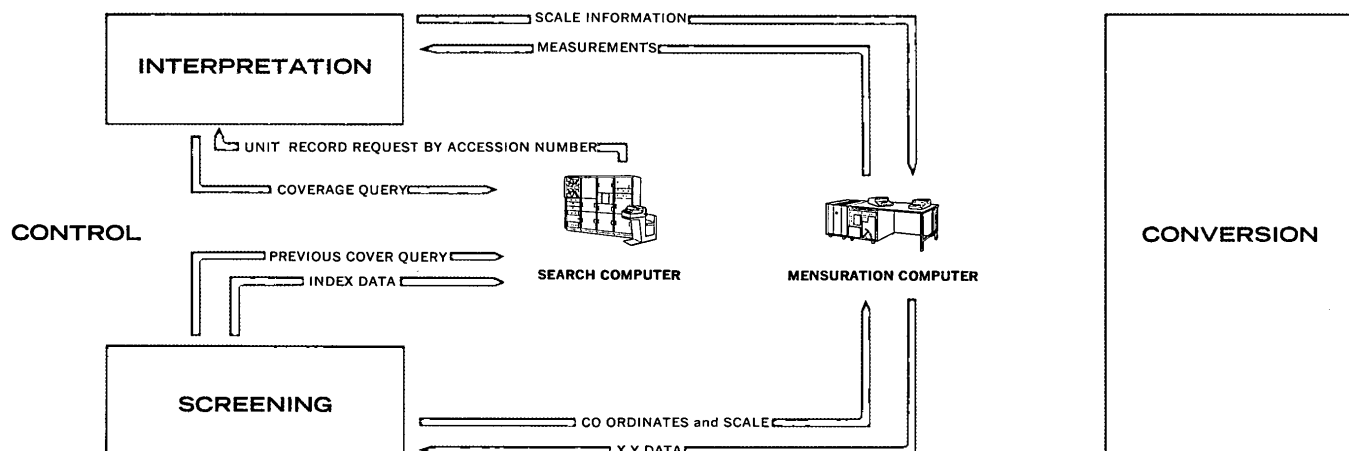
The basic equipment complement includes a detail viewer, a screening viewer, and the storage and retrieval system. Other analytical devices and more sophisticated data handling equipment can be added for other system configurations or for expanding the photo interpretation capability of the complex.





All phases of photographic data extraction can be assisted by computers. This support falls into the general areas of control, information handling, and computation. Information handling includes such tasks as file searching, report generation, data presentation control, and parameter correlation.

The current Project SCRAM complex utilizes the support of two computers — the RECOMP II Computer and the AN/GSQ-26 Search Computer. The RECOMP II finds its chief application in performing small scale computations useful during formatting. In the AN/GSQ-26 Search Computer, a subject store with certain associated posting and flag information is maintained for answering queries as to file contents, applicable Unit Record numbers, and the like. In practice, the AN/GSQ-26 serves as an index for the Unit Record Storage and Retrieval Device. With these computers the tasks of file searching and computation are accomplished. They graphically illustrate the ability of the concept to utilize equipments currently available, but are not indicative of the only potential in the computational support area.





Project SCRAM may be considered a group of equipment and techniques to fulfill all of the data handling requirements necessary to complement current operational inventories for utilization of film chips.

Flexibility has been considered a crucial requirement in implementing project functions. Inputs to the typical system may be 70mm through 9½ inch roll film, and opaque copy of various types and sizes. Film strips and film chips (in 70mm widths) must be handled. Capabilities must be ensured to screen, analyze, format, and record select photo-intelligence information on a standard 70mm film format. Provisions for copying, enlarging and reducing imagery are required, and ability to generate and record auxiliary data and Unit Record accession numbers is also a requirement.

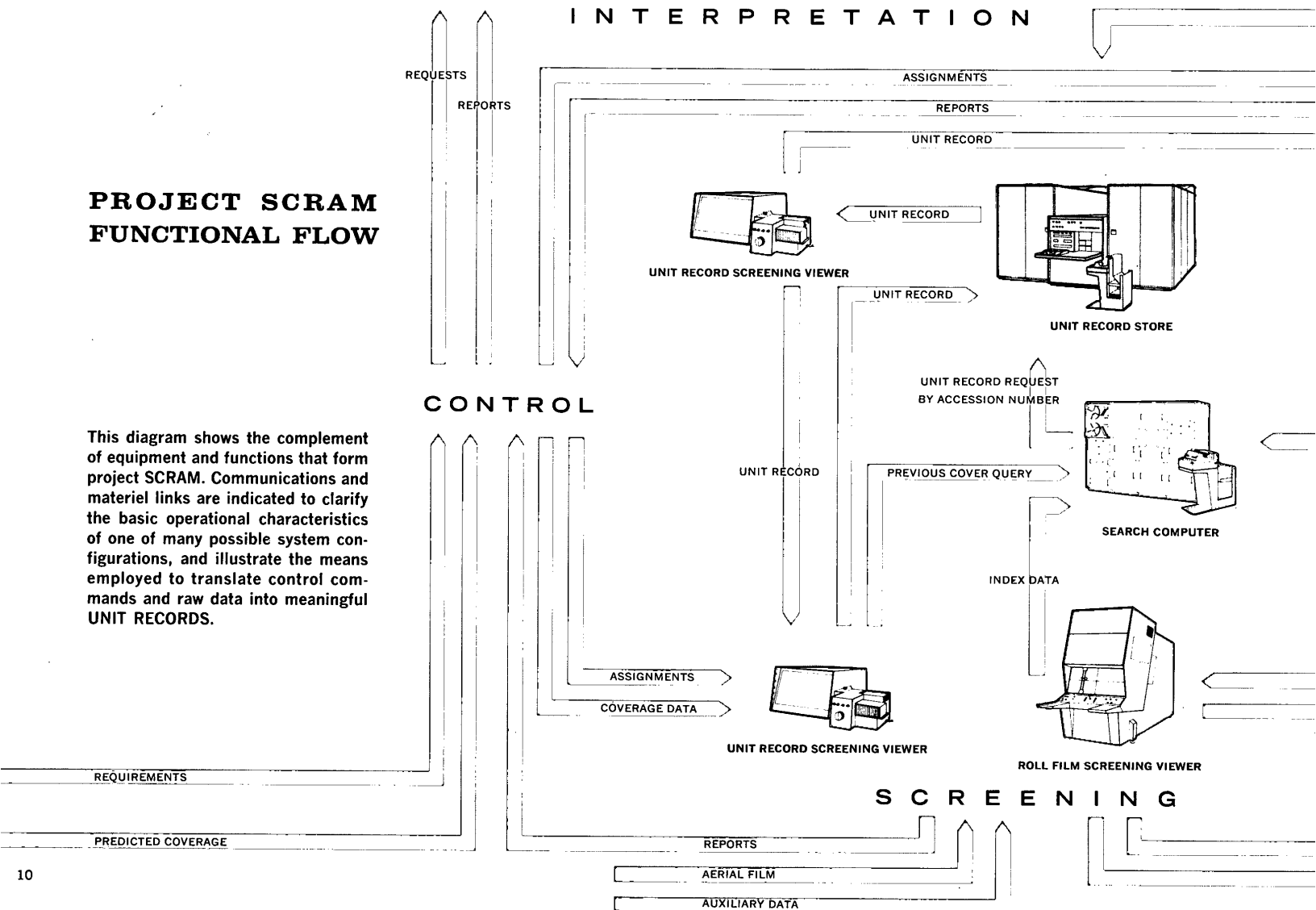
The flow of materials and information consistent with the functions and scope of such a system is depicted in the following diagram. The basic, necessary functions of screening, conversion, and interpretation are integrated and sustained through communications, reporting procedures, computational support, and information files.

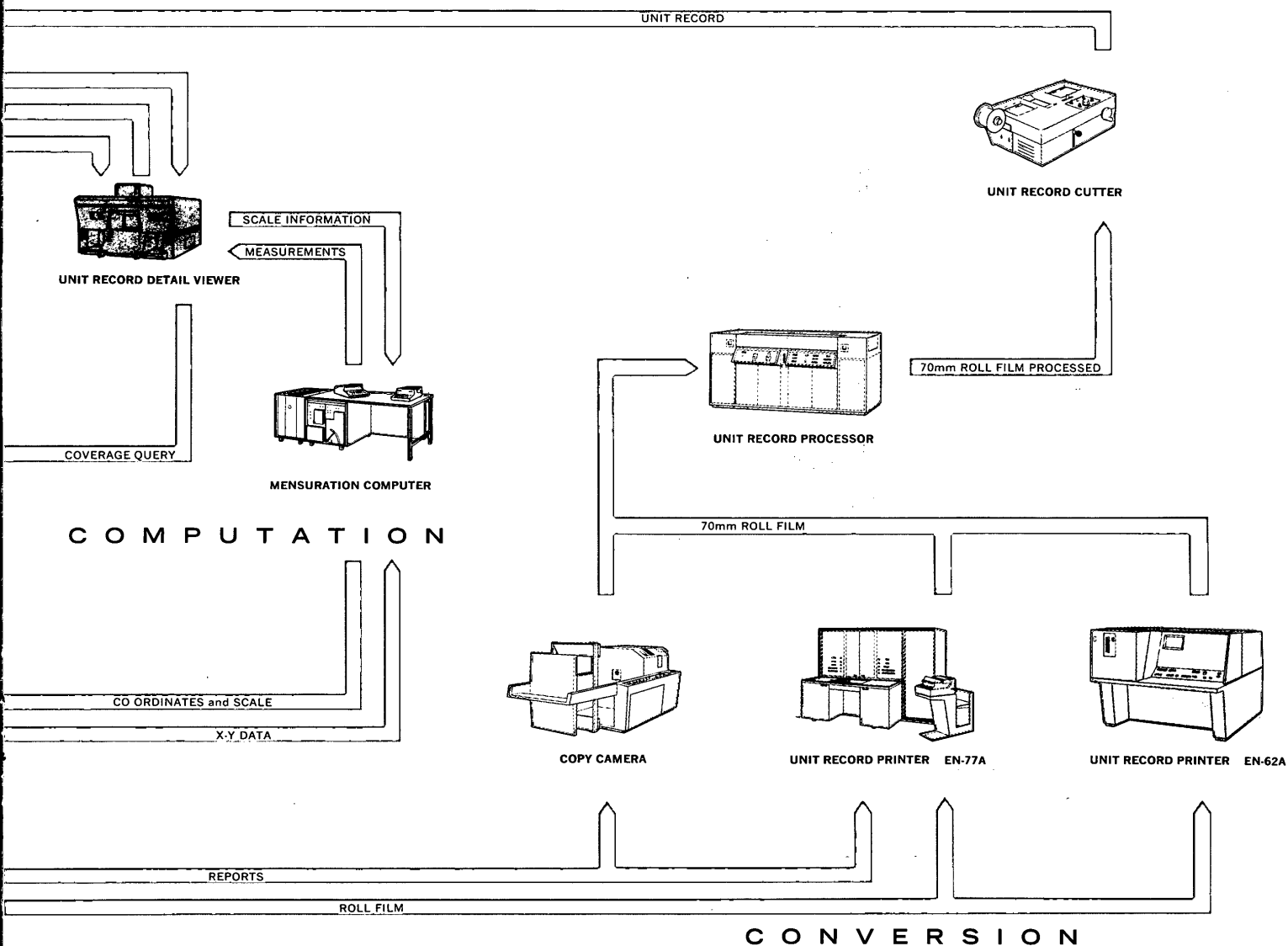
The screening and selection equipment handles various sizes of aerial roll film as raw stock. This film and opaque copy are formatted onto 70mm strip film and processed to obtain Unit Records. The complement of interpretation equipment provides for the analysis, storage, and retrieval of Unit Records exclusively.

Equipment prototypes developed for Project SCRAM, accomplish all requisite functions without attempting to reach total automation.

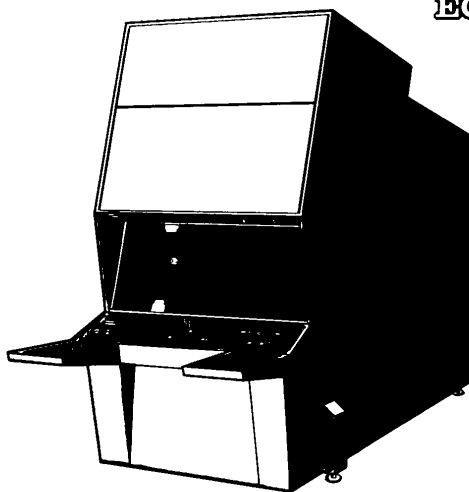
## PROJECT SCRAM FUNCTIONAL FLOW

This diagram shows the complement of equipment and functions that form project SCRAM. Communications and materiel links are indicated to clarify the basic operational characteristics of one of many possible system configurations, and illustrate the means employed to translate control commands and raw data into meaningful UNIT RECORDS.





## SCREENING EQUIPMENT



## ROLL FILM SCREENING VIEWER

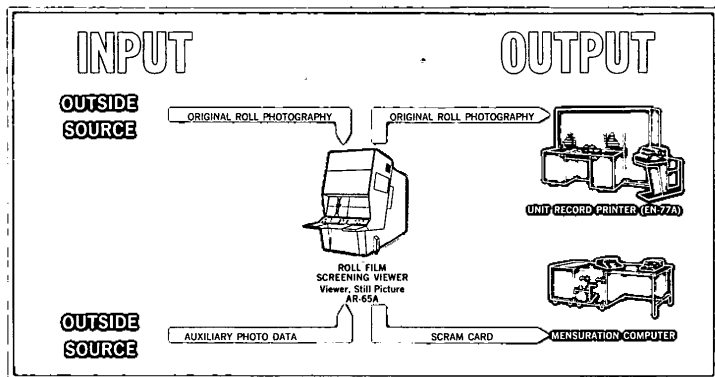
VIEWER, STILL PICTURE, AR-65A

The Roll Film Screening Viewer provides a capability for rapid initial scanning of new photography for immediate reporting on the success of a photo mission, and for assignment of duplication and detailed interpretation tasks.

The Viewer will accept films from 70mm to 9½ inches in width. Variable magnifications from 2X to 6.5X in continuous sharp focus are possible on the 19 by 36 inch inclined screen. An externally mounted magnifying unit provides additional magnifications from 2X and 4X. The projection lens, made by C. P. Goerz American Optical Company is a 19-inch f/11 Artar, and is essentially distortionless throughout the range of magnifications with no greater than 0.1mm distortion on the screen out to the extreme corners.

The complete console is 108 inches long, 44 inches wide (maximum) and 92 inches high. The inclined control panel features illuminated pushbutton controls and a single joy stick control for the film transport. A shielded fluorescent lamp illuminates the panel and conveniently mounted writing table extensions. The lamp housing and condenser assembly for the projector are in a readily accessible compartment just above the film transport mechanism and viewing screen. All electronic components are mounted in four drawer-type cabinets beneath the control panel.

Using the Roll Film Screening Viewer, an operator can rapidly and accurately record the number of frames and locate points of interest in new photographic material.





## UNIT RECORD SCREENING VIEWER



VIEWER, STILL PICTURE, AR-66A

The Unit Record Screening Viewer functions in the initial interpretation of new material by displaying reference data, and in the review of material being brought from file for detailed analysis. Up to 64 Unit Records can be displayed in sequence using a single load magazine (cassette).

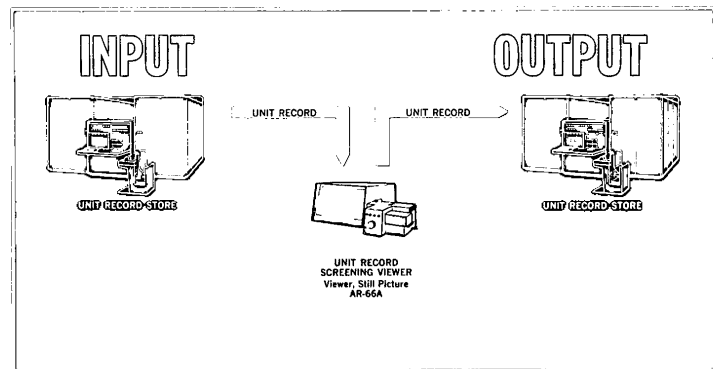
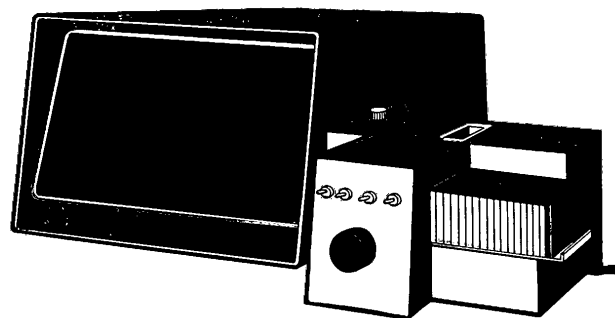
Maximum portability and versatility have been obtained by designing the Unit Record Screening Viewer as two integrated units: a projector and a 16 x 24 inch rear view projection screen. An image can thus be projected at a 6.5X magnification on the integrated screen or projected on a standard (separate) screen for presentation to a large audience.

Operator control is provided for an illumination system that will suitably project a Unit Record with densities up to 2.0 and a resolution of 100 lines per millimeter AWAR, medium contrast.

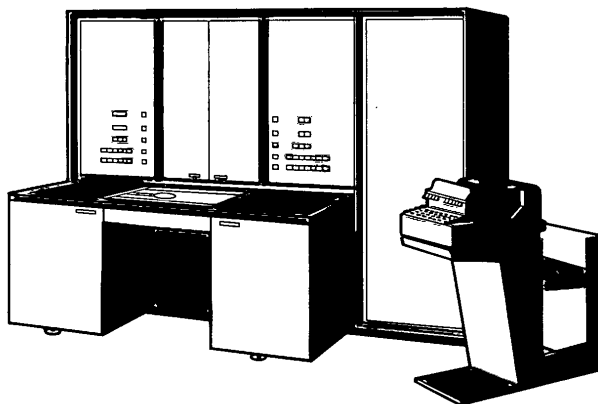
A change lever is provided for operator control of Unit Records to be viewed. The load cassette holds 65 Unit Records which will change automatically upon command for sequential viewing. Change time is two seconds. Any random Unit Record can be brought to the projection plane in approximately ten seconds.

Other controls on the compact control panel include an On/Off switch, Load, Operate/Edit Switch, Forward/Reverse Select Knob, Edit Lever, and Focus Knob. The Unit Record Screening Viewer is 53½ inches wide, 23 inches high, and 40 inches deep.

## SCREENING EQUIPMENT



## CONVERSION EQUIPMENT



## UNIT RECORD PRINTER

PRINTER, CONTACT, PHOTOGRAPHIC EN-77A

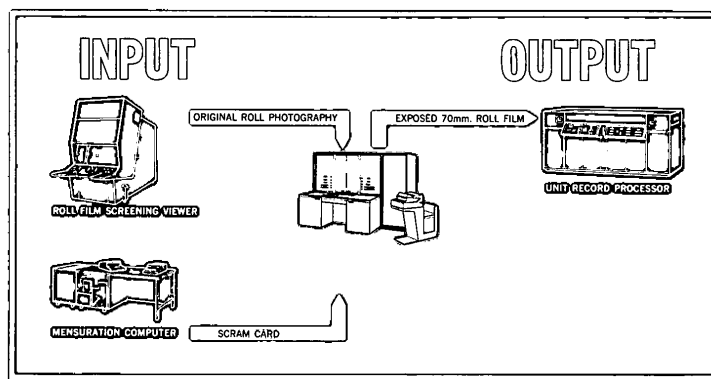
The Unit Record Printer EN-77A converts selected portions of reconnaissance film to 70mm X 100mm film chips for use as Unit Records. The Printer will accept input roll film (up to 500 feet) in widths from 70mm through 9½ inches. The unit is a semi-automatic, high resolution, contact printer with a maximum output capacity of 250 feet of 70mm film.

Selection and display of the location, size and relative orientation of the area to be reproduced can readily be accomplished, and automatic exposure control, operating on an average density basis, compensates for variations in film density and emulsion speed. The operator can override this control. Variations in output film speeds from 0.02 to 2.0 "C" can be accommodated.

Light within the 0.35-0.45 micron spectral range, collimated  $\pm 7.5^\circ$  to ensure resolution without degradation, is provided by this illumination system with an intensity margin adequate to allow full exposure under the worst combination of film speed, normal variations in line voltage, source brilliance, and input film density.

When contact printing from reconnaissance film, the image area on the Unit Record will be 67 X 84mm maximum. Image area length may be reduced by 3mm, then incrementally by 2mm steps to 63mm to make room for auxiliary data; area width may be reduced to 63mm or 57mm. The maximum image area for Unit Records is 70mm X 100mm. Manual or punched tape inputs of up to 180 characters (for identification and descriptive data) can be accepted by the printer.

Automatic tension controls and film cleaning devices are incorporated into film transport mechanisms to minimize hazards in film handling, and an automatic counter which can be preset to count frames from 70mm to 150 inches is also included.

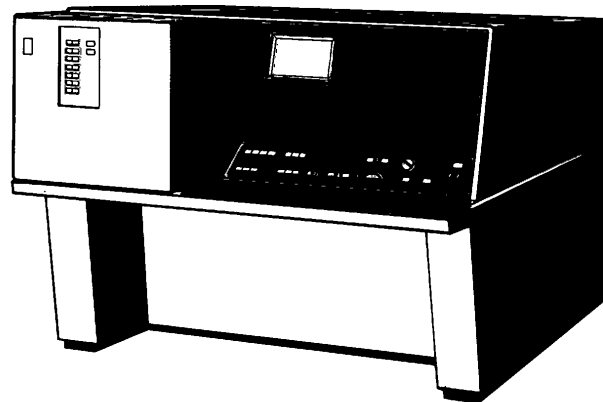


## UNIT RECORD PRINTER



PRINTER, PHOTOGRAPHIC, EN-62A

## CONVERSION EQUIPMENT

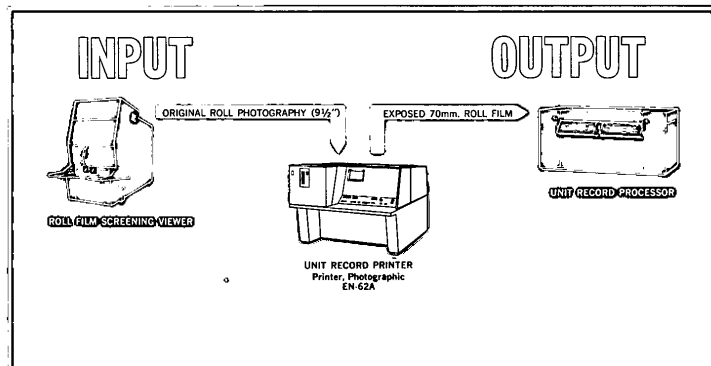


The Unit Record Printer EN-62 transfers images recorded on 9½ inch roll film to 70mm roll film, which will be cut to standard size for storage as Unit Records in Project SCRAM. This printer consists of a feed roller assembly for the 9½ inch roll film source material, a photo-optical system for the transfer of the image, a takeup roller assembly for the 70mm roll film, and a punching device which perforates the 70mm roll film at 116mm intervals for precise alignment in the Unit Record Cutter. A number generator is provided in the device to display an alpha-numeric code selected by the operator. A separate photo-optical system transfers the displayed Unit Record identification numbers to the 70mm film.

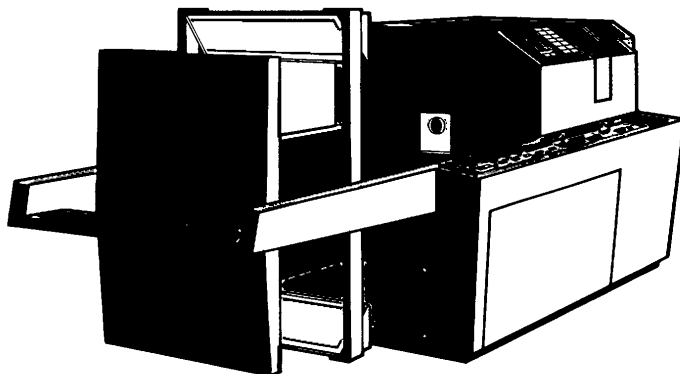
The equipment is capable of printing from one to ten copies of the 9½ inch film in frame lengths of either 9½ or 18 inches. Two separate, high quality enlarger lenses are provided for the two sizes. Viewing optics permit the operator to visually align the source material and check the identification number before each exposure. Exposure selection switches ranging from 0.5 second to 2.0 seconds are provided to allow the operator control of the quality of the reproduced image.

To ensure the most efficient operation of the device, a prominent red warning indicator is provided on the control panel. If the indicator is lighted, the operator is signaled to check specific malfunction indicators, and correct the defects before continuing operation.

This camera was developed under a previous project and modified for use in Project SCRAM because it represents a capability required in a Unit Record system.



## CONVERSION EQUIPMENT



## UNIT RECORD PRINTER

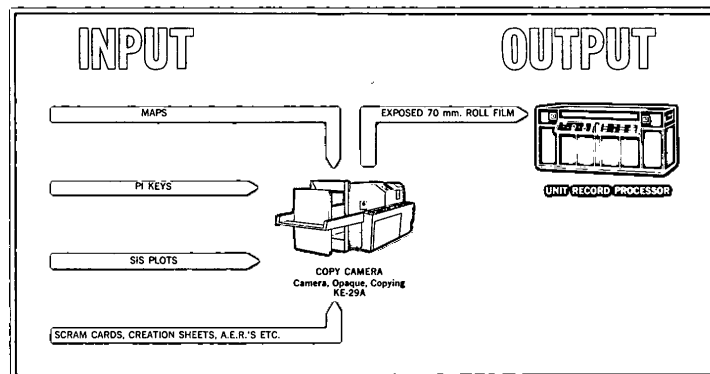
CAMERA, OPAQUE, COPYING, KE-29A

The Copy Camera KE-29 is used in Project SCRAM to convert opaque copy material to Unit Records. The maximum size of opaque copy that is accepted by the camera is 36 by 24 inches.

The movable copy table is a power driven, joy stick controlled device for adjusting the distance of the copy from the camera lens for maximum utilization of the 70mm frame. The joy stick has both coarse and fine speed control of the movement of the copy table away from and toward the camera. A fixed lighting system provides standard lighting for each exposure. A variable exposure capability is provided by a series of switches on the control panel to allow the operator control over the quality of the reproduced image.

A number generator, controlled by the operator, is provided in the device to display the alpha-numeric code (Unit Record number) that is selected to identify the Unit Record. A separate enlarger lens transmits the Unit Record number to the film.

This camera was developed under a previous project and modified for use in Project SCRAM because it represents a capability required in a Unit Record system.



## UNIT RECORD PROCESSOR



PROCESSOR, PHOTOGRAPHIC, EH-36A

The Unit Record Processor EH-36 is a leaderless processor designed to produce film images of archival quality with emphasis on dimensional stability. The device is capable of processing 70mm roll film in lengths up to 100 feet, or 70mm x 100mm film chips.

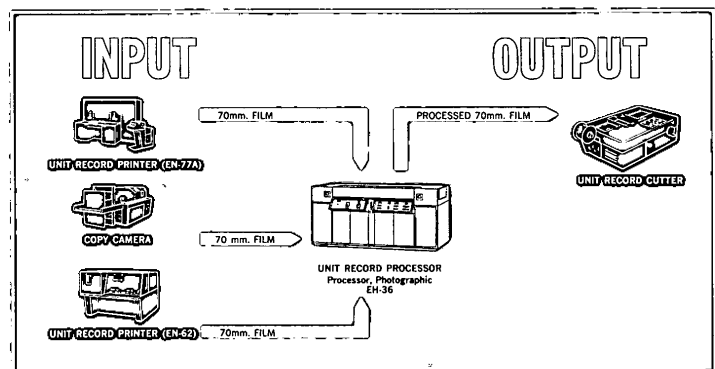
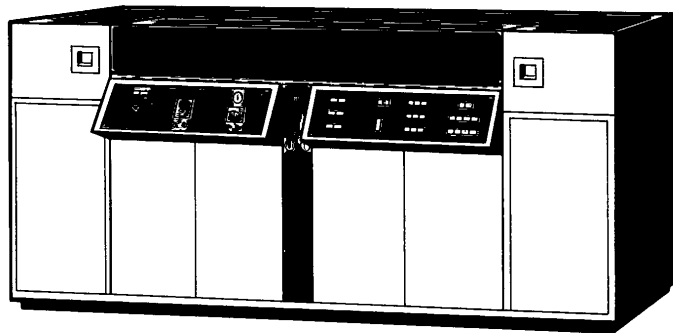
The EH-36 is constructed to allow the film to pass through the stages of development in a vertical orientation. This makes it possible to spray both sides of the film with solutions, preventing physical distortion that could result from uneven wetting.

Spraying the vertically oriented film allows the solution to flow off immediately into sump tanks. No wiper blades, which could physically distort or damage the film, are needed. Image quality is further enhanced because only fresh solution comes into contact with the film at all times. Electronic probe units controlling the refrigeration and heating units provide solution temperature control within  $\pm 0.25$  degree F.

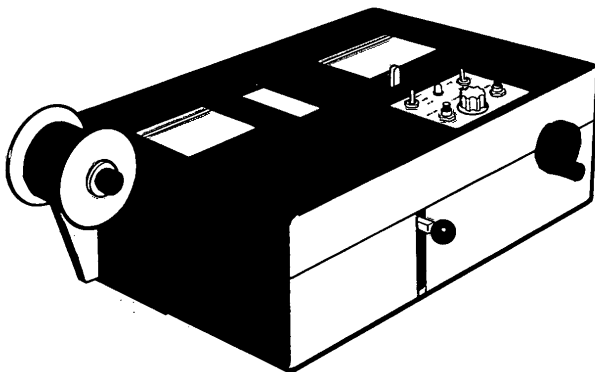
The possibility of physical damage to the film is avoided by a series of vertical rollers so designed that only the edges of the film are contacted during transport. A series of cross-rod rollers at the bottom edge of the film prevents any mis-tracking.

Film can be processed in 83 seconds at a speed of 5 feet per minute. Speed is variable from 0-10 feet per minute.

## CONVERSION EQUIPMENT



## CONVERSION EQUIPMENT



## UNIT RECORD CUTTER

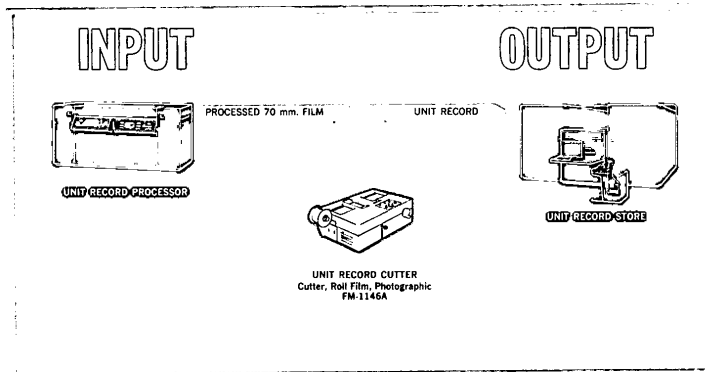
CUTTER, ROLL FILM, PHOTOGRAPHIC, FM-1146A

The portable Unit Record Cutter is a power driven, automatic device to cut processed 70mm roll film into film chips or Unit Records for use in Project SCRAM. The input of 70mm roll film may be in the form of 250-foot standard Air Force spools or may be fed directly from the EH-36 film processor. Prior to insertion in the Unit Record cutter, the 70mm film must be perforated at intervals of 116mm. The cutter is designed to sense the locations of the perforations, stop the film in the proper position, and cut the film to Unit Record chip size.

The Unit Record Cutter is capable of variable speed operation with a maximum capability of cutting 20 chips per minute. Chips are ejected at the output station for manual insertion in plastic holders. A drive mechanism has been conveniently located at the output station for the addition of an automatic device for loading the film chips in plastic mounts.

A viewing device on the Unit Record Cutter allows the operator to visually check the chips in the cutter when operating at slow or manual speeds. A switch on the control panel gives the operator the option of accepting or rejecting each film chip. A rejected chip is eliminated from the cutter before reaching the output station.

In addition to the automatic power drive, the 30 pound device is capable of manual drive and operation.



## UNIT RECORD STORE



CUT FILM, STORAGE AND RETRIEVAL SET, BS-6A

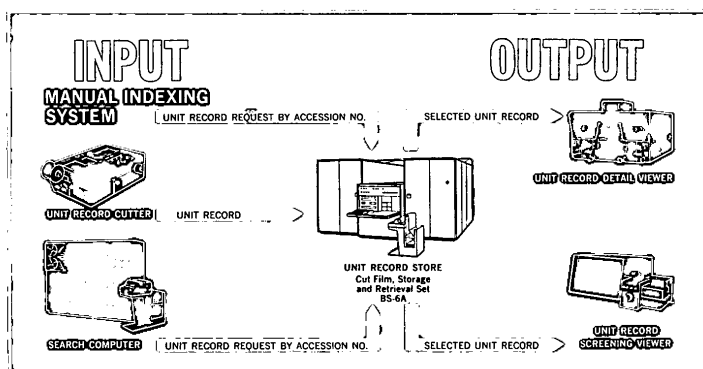
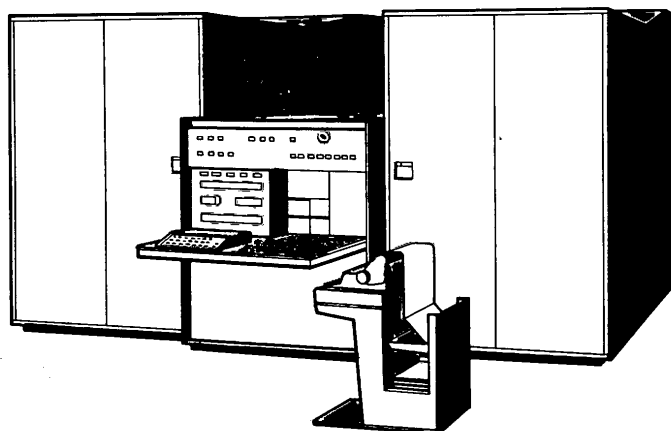
This device files and rapidly retrieves Unit Records. Storage facilities for 10,240 Unit Records, a memory drum, and access/control logic are incorporated. Unit Records are randomly stored in individual compartments, and each location has a numeric designation associated with a corresponding location on the memory drum. Capacity can be expanded considerably by adding storage cabinets to a specialized programming unit. Maximum retrieval time for any record is ten seconds, and a group of sixty records can be retrieved within three minutes.

Four modes of operation are available: file, retrieve, retrieve by class, and query. During all modes, a hard copy record of requests and dispositions is automatically prepared by typewriter. Filing can take place simultaneously with any of the three other modes.

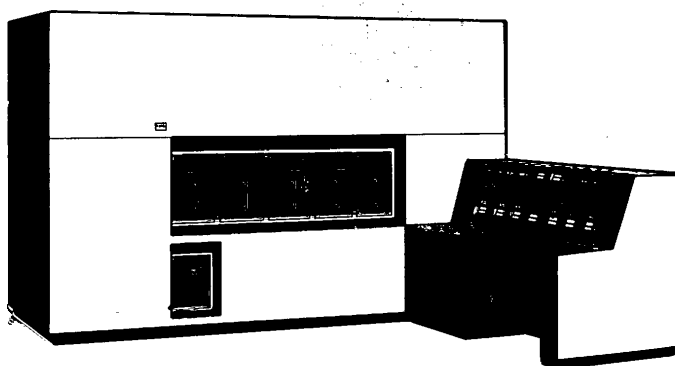
Unit Records are filed via the input station, and the device automatically reads the identity number, places the record in random storage and records the identity number.

Retrieve-by-Class makes it possible to request all Unit Records having identical characters in the identity codes (i.e., records within a certain class). This is possible because the number of identifiers in Unit Record numeric characters provide a capability for categorizing with maximum flexibility. Query provides means, without physical retrieval, to inquire if the device contains a specific record or group of records. To retrieve a particular Unit Record the request may be entered by manual keyboard, punched tape, or an on-line computer.

## INTERPRETATION EQUIPMENT



## INTERPRETATION EQUIPMENT



## UNIT RECORD SECOND LEVEL SEARCH DEVICE

As an experimental equipment developed under Project SCRAM, the Unit Record Second Level Search Device represents another engineering approach for the storage, retrieval, and dissemination of Unit Records. Here, Unit Records, or carriers, are requested by means of a two level question.

The first level makes use of a four decimal digit descriptor recorded magnetically on the carrier. This code is read serially from the edge of the moving carrier. Track switches set by the logic route the carrier through the optical code reading station or to file.

The second level part of the request is based on 15 four-digit descriptors contained in the photo code strip on the carriers. The 4 pin carrier is propelled by an air stream and guided by the pins in a four groove track system. Track switches, controlled through the electronic logic by code contained on the carrier, determine the paths taken by the carriers through the system.

The device contains 1000 Unit Records in two permanent storage bins. The carriers are assigned to one or the other of these two bins, and return to their proper bin by means of mechanical coding on the carrier.

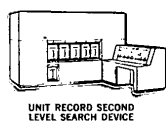
In order to prevent a carrier being lost in the system due to damage or misreading of the code, self-clocking serial coding scheme is used to permit automatic checking of every code pattern for completeness, and ejection of any that are faulty. The problem is, of course, trivial with only 1000 records, but with a large file it can be important.

INPUT

OUTPUT

UNIT RECORD

UNIT RECORD



UNIT RECORD SECOND  
LEVEL SEARCH DEVICE

UNIT RECORD REQUEST BY ACCESSION NO.

UNIT RECORD



## UNIT RECORD DETAIL VIEWER



VIEWER, STEREOSCOPIC, CUT FILM, PHOTO INTERPRETATION, AR-68A

The Unit Record Detail Viewer is used in the detailed analysis of the photographic material stored in each Unit Record.

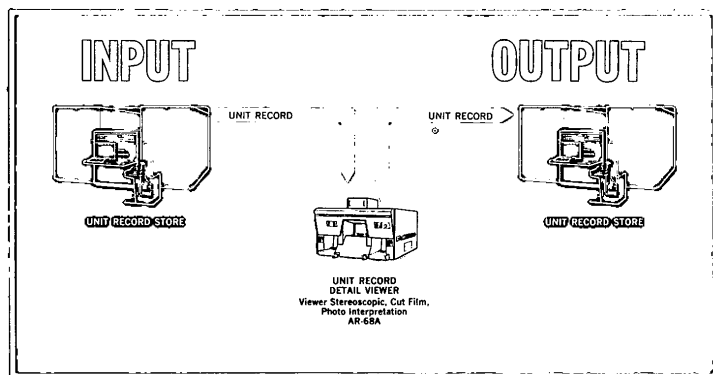
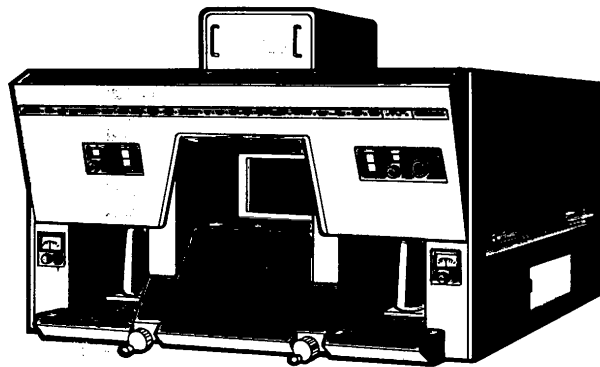
The Viewer presents an image, focused at infinity, through a ten-inch exit pupil. The approximation of aerial imaging with its resultant high quality presentation and an exit pupil approximately the size of a human head permits a freedom of head movement not possible in any other equipment of this type. Although microscopes and other types of aerial imaging optical instruments, are capable of quality image presentation, they require the eye to be placed close to the instrument and held in a fixed relative position.

The Unit Record Detail Viewer is designed for both stereo and single image viewing of the Unit Records. Provision has been made for 360 degree image rotation, mensuration to  $\pm 10$  microns, and simplified fusion of stereo pairs. Maximum resolution for the system is about 230 lines per millimeter at the film plane.

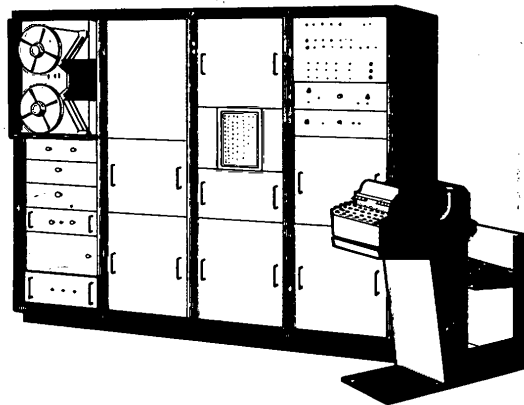
The overall magnification range of the Viewer is 2.1X to 204X. Magnification is continuously variable from 2.1X to 37X within the unit. Zoom binoculars provide an additional external magnification range of 1.38X to 5.5X with no loss of image brightness.

The Viewer is 50 inches long, 36 inches high and 36 inches deep. The binocular bridge is contained in a module above the main viewer assembly and is easily adjusted for operation.

## INTERPRETATION EQUIPMENT



## COMPUTATION EQUIPMENT



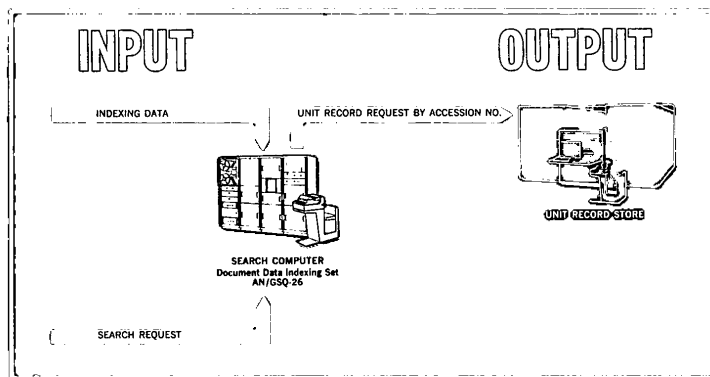
## SEARCH COMPUTER

DOCUMENT DATA INDEXING SET, AN/GSQ-26.

The Search Computer is an AN/GSQ-26x. Its capacity is one million seven-character words held on a single reel of magnetic tape. At a rate of 110 inches per second, 4.5 minutes are required to search the alpha-numeric data file on the tape. Input-output is by means of paper tape or Flexowriter. The computer is programmed for editing or updating index data on the magnetic tape, as required.

This computer was not developed under Project SCRAM. It is demonstrated because it represents an operational function that can possibly be better served by a small special purpose computer than by dependence upon a large general purpose type.

The Search Computer is used to answer prescribed questions regarding the type of information held on given subjects and locations; i.e., whether or not data on a given subject is in file, the quantity; dates the information was obtained; and the index numbers of the Unit Records that apply.



## MENSURATION COMPUTER

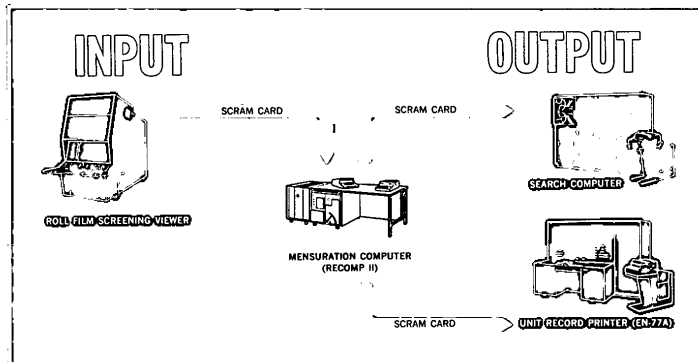
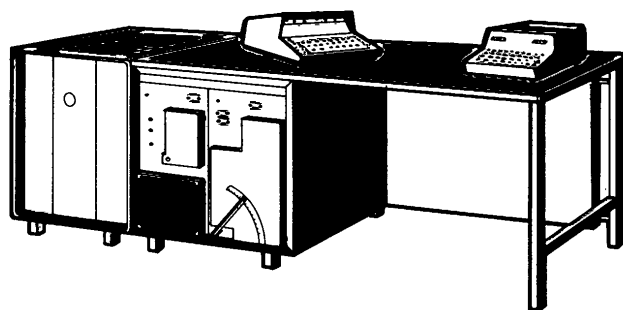


RECOMP II

The Recomp II is a small standard commercial computer, and the functions it performs in support of the system can be handled by almost any small computer on the market. Its use in the system illustrates the project concept of making maximum use of currently available equipment.

In the preparation of Unit Records, this computer is used to determine and record accurate position data for the film information stored on each Unit Record. The computer utilizes the corner locations on the photographic frame from the aerial reconnaissance camera to determine the latitude, longitude, nadir and corner locations for each Unit Record made from the original frame. An internally stored program enables the machine to perform these computations on command.

## COMPUTATION EQUIPMENT



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## **NOTES**

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PROJECT SCRAM



AIR FORCE SYSTEMS COMMAND - ROME AIR DEVELOPMENT CENTER, ROME, NEW YORK

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